Managing risk: historical portfolio stress-testing

By Quintin Rayer | May 4, 2017

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Recap on portfolio stress-testing

To recap, extreme market moves can negatively impact portfolios in ways which may not be captured by conventional risk measures and diversification breakdown may mean that portfolio values are not protected. With guidance, stress-testing may be used to estimate the impact on portfolios, and if necessary, then appropriate

restructuring can limit the downside. Typically stress-testing may look at significant historical market events or scenarios that reflect particular concerns.

A key distinction is between historical scenarios (re-enactments of particular market events) and artificial scenarios (invented to capture particular concerns and often involving assumptions) [1]. Since many portfolio concerns may be motivated by past events those interested in stress-testing might do well to make a study of historical market crashes. In this context, it is very natural to attempt to use past events as a source for stress-tests and this article discusses two of the approaches that may be used.

Historical Value at Risk (VaR) stress-testing

Historical scenarios comprise a period with defined start and end dates over an interval when assets performed poorly. Asset price behaviours over the period are applied to the portfolio to see how it would respond. Methods used include 'value-at-risk' (VaR) and 'event period' stress-tests.

The VaR risk measure is often used by portfolio managers. It estimates possible losses and likelihoods over selected timescales using returns distributions. However, VaR may assume returns are normally distributed – the so-called bell-shaped curve often used in statistics. During stressed conditions this might be inadequate, making a technique known as 'historical VaR' more appropriate.

Historical VaR takes actual period returns, usually over some period to date. Historical VaR tests add returns from an earlier period to see how these impact the result [2]. Suppose returns from April 2014 to March 2017 were used. If a period in 2008 caused concerns, these returns would be included and the result recalculated. However, historical events may not be a reliable guide to the future and other criticisms include using an arbitrarily-shaped distribution, and loss of returns path-dependency.

Historical event-period stress-tests

Here a different process is used to apply returns from a historically difficult period to the portfolio.

Historical event-period stress-tests require defined start and end dates for a crisis. These may prove less obvious than at first glance. For an individual market index,

peaks and troughs may seem clear. However, across markets, historical events may evolve over extended periods due to market linkages and feedback. In a portfolio, a decline in one asset may coincide with another rising. When the second asset collapses, the first may already be recovering.

Two approaches can be used. Either, fixed start and end dates are selected, which allows the rise in one asset to offset the decline in the other, or else to 'break the timeline' and apply the maximum declines in each asset simultaneously. Preserving the timeline, with the uplift from one asset offsetting the fall from another, makes better sense economically, but is a less demanding stress-test. Breaking the timeline with simultaneous price falls makes little economic sense, but a more demanding test.

How advisers can add value

An adviser can play an important role by working with the investment manager to add value in terms of helping to identify suitable portfolio concerns and interpreting test results against portfolio objectives. For stressed scenarios that have little impact on a portfolio, it reassures that the event may be of lesser concern than feared. Conversely, if a portfolio looks to be badly impacted, an adviser can work with the manager to see that the portfolio is restructured to make it more resilient.
This helps demonstrate that advisers are working hard to protect portfolios and clients can be reassured that robust investment processes are in place.

References

[1] Q. G. Rayer, "Dissecting portfolio stress-testing," Review of Financial Markets, vol. 7, pp. 2-7, 2015.
[2] B. Schachter, "Stress testing," in The Professional Risk Managers' Handbook, vol. III, C. Alexander and E. Sheedy, Eds., Wilmington, DE: PRMIA Publications, 2004.

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